Table 3-1

Sampling Locations and Rationale
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
SI17-SS01	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected north and upslope of the trenches to determine potential impacts to the area.
SI17-SS02	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected adjacent to a trench location to determine potential impacts to the area.
SI17-SS03	Surface Soil Subsurface Soil	Surface and subsurface soil samples were collected adjacent to a trench location and downslope of a partially buried drum to determine potential impacts to the area.
SI17-SS04	Surface Soil Subsurface Soil	Surface soil and subsurface soil samples were collected downslope (south) of the trenches and a concrete slab to determine potential impacts to the area.
SI17-SS05	Surface Soil	A surface soil sample was collected east of the concrete slab to determine potential impacts to the area.
SI17-SS06	Surface Soil	A surface soil sample was collected north of the concrete slab to determine potential impacts to the area.
SI17-SS07	Surface Soil	A surface soil sample was collected west of the concrete slab to determine potential impacts to the area.
SI17-SS08	Surface Soil	A surface soil sample was collected south of the concrete slab to determine potential impacts to the area.
SI17-TP01/TP02	Subsurface Soil	Two discrete soil samples were collected from a test pit near the northeastern corner of the trenches to determine potential impacts to the area.
SI17-TP03/TP04	Subsurface Soil Surface Soil	Two discrete soil samples were collected from a test pit near the western edge of the trenches to determine potential impacts to the area. Sample TP04 was collected from the surface of the trench.
GSBP-154-MW01	Groundwater	A groundwater sample was collected from a well installed in the northern part of the trenches and downgradient of the partially buried 55-gallon drum to determine potential impacts to the local aquifer.
GSBP-154-MW02	Groundwater	A groundwater sample was collected from a well installed upgradient (east) of the trench area to determine potential impacts to the local aquifer.
GSBP-154-MW03	Groundwater	A groundwater sample was collected from a well installed downgradient (southwest) of the trench area to determine potential impacts to the local aquifer.
GSBP-154-MW04	Groundwater	A groundwater sample was collected from a well installed downgradient of the trenches and near the concrete slab to determine potential impacts to the local aquifer.

Table 3-2

Soil Sample Designations and QA/QC Samples
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft. bgs)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
SI17-SS01	17-SS01A 17-SS01B	0-1 3-4	17-SS01A-FD 17-SS01B-FD			TCL VOCs, TCL SVOCs, Cl Herbicides, Pest/PCBs, TAL Metals, Nitroexplosive and TOC*
SI17-SS02	17-SS02A 17-SS02B	0-1 3-4				TCL VOCs, TCL SVOCs, Cl Herbicides, Pest/PCBs, TAL Metals
SI17-SS03	17-SS03A 17-SS03B	0-1 3-4				TCL VOCs, TCL SVOCs, Cl Herbicides, Pest/PCBs, TAL Metals, Nitroexplosives and TOC*
SI17-SS04	17-SS04A 17-SS04B	0-1 3-4				TCL VOCs, TCL SVOCs, Cl Herbicides, Pest/PCBs, TAL Metals
SI17-SS05	17-SS05	0-1				TCL VOCs, TCL SVOCs, Cl Herbicides, Pest/PCBs, TAL Metals
SI17-SS06	17-SS06	0-1				TCL VOCs, TCL SVOCs, Cl Herbicides, Pest/PCBs, TAL Metals
SI17-SS07	17-SS07	0-1				TCL VOCs, TCL SVOCs, Cl Herbicides, Pest/PCBs, TAL Metals
SI17-SS08	17-SS08	0-1				TCL VOCs, TCL SVOCs, Cl Herbicides, Pest/PCBs, TAL Metals
SI17-TP01/TP02	17-TP01 17-TP02	2-4 1-3				TCL VOCs, TCL SVOCs, Cl Herbicides, Pest/PCBs, TAL Metals, Nitroexplosives
SI17-TP03/TP04	17-TP03 17-TP04	3-5 0-1				TCL VOCs, TCL SVOCs, Cl Herbicides, Pest/PCBs, TAL Metals, Nitroexplosives

* Subsurface soil sample only.

Cl - Chlorinated.
FD - Field duplicate.
ft. bgs - feet below ground surface.
MS/MSD - Matrix spike/matrix spike duplicate.
Pest/PCB - Pesticide/Polychlorinated Biphenyl.
QA/QC - Quality assurance/quality control.
SVOC - Semivolatile organic compound.
TAL - Target analyte list.
TCL - Target compound list.
TOC - Total organic compound.
VOC - Volatile organic compound.

sample designations, depths, and QA/QC samples are listed in Table 3-2. Soil boring sampling locations were determined in the field by the on-site geologist based on the sampling rationale.

Sample Collection. QST contracted Graves Service Company, Inc. to complete the soil borings in accordance with procedures outlined in the QST work plan (QST, 1998). Subsurface soil samples were collected at a depth of 3 to 5 feet bgs. The samples were analyzed for parameters listed in Table 3-2 using methods outlined in Section 3.3. Sample collection logs are included in Appendix A.

In addition, QST collected three subsurface soil samples from the two test pits that were excavated in the trench area. The soil samples were collected from the backhoe bucket using a stainless-steel spoon and bowl. Each test pit transected two of the trenches (Figure 3-2). The samples were collected to determine whether the trenches were used for any disposal activities.

3.1.3 Well Installation

IT installed four permanent groundwater monitoring wells at the Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7), as shown on Figures 3-1 and 3-2. QST installed four DPT borings, ranging in depth from 12 to 25 feet bgs prior to refusal. Each boring was dry, and no wells were installed. Table 3-3 summarizes construction details of the wells installed by IT at Parcel 154(7). The well construction logs are included in Appendix B.

Well Installation. IT contracted Miller Drilling, Inc. to install the wells with a hollow-stem auger rig at the locations shown on Figures 3-1 and 3-2. The wells were installed following procedures outlined in Section 4.7 and Appendix C of the SAP (IT, 2000a). The boreholes were advanced with a 4.25-inch inside diameter (ID) hollow-stem auger from ground surface to the first water-bearing zone in residuum. A 2-foot-long, 2-inch ID carbon steel split-spoon sampler was driven at 5-foot intervals to collect residuum for observing and describing lithology. Where split-spoon refusal was encountered, the auger was advanced until the first water-bearing zone was encountered. The on-site geologist constructed a lithological log for the borehole by logging the auger drill cuttings. The drill cuttings were logged to determine lithologic changes and the approximate depth of groundwater encountered during drilling. This information was used to determine the optimal placement of the monitoring well screen interval and to provide site-specific geological and hydrogeologic information. The lithological logs for the boreholes are included in Appendix B.

Upon reaching the target depth, a 20-foot-length of 2-inch ID, 0.010-inch continuous-slot, Schedule 40 polyvinyl chloride (PVC) screen (attached to either a PVC end cap or a section of

Table 3-3

Monitoring Well Construction Summary
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7)
Fort McClellan, Calhoun County, Alabama

Monitoring Well	Northing	Easting	Ground Elevation (ft above msl)	TOC Elevation (ft above msl)	Well Depth (ft bgs)	Screen Length (ft)	Screen Interval (ft bgs)	Well Material
GSBP-154-MW01	1171766.27	663752.24	872.02	873.99	105	20	80 - 100	2" ID Sch. 40 PVC
GSBP-154-MW02	1171722.03	663775.25	873.14	875.26	100	20	80 - 100	2" ID Sch. 40 PVC
GSBP-154-MW03	1171721.66	663707.37	866.33	868.39	100	20	80 - 100	2" ID Sch. 40 PVC
GSBP-154-MW04	1171761.29	663669.89	856.79	859.00	90	20	67 - 87	2" ID Sch. 40 PVC

Monitoring wells installed using hollow-stem auger.
Horizontal coordinates referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983 (NAD83).
Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).
2" ID Sch. 40 PVC - 2-inch inside diameter, Schedule 40, polyvinyl chloride.
bgs - Below ground surface.
ft - Feet
msl - Mean sea level.

PVC sump) was placed through the auger to the bottom of the borehole. The screen was attached to 2-inch ID, flush-threaded Schedule 40 PVC riser. A sand pack consisting of number 1 filter sand (environmentally safe, clean fine sand, sieve size 20 to 40) was tremied around the well screen to approximately 6 feet above the top of the well screen as the augers were removed. The well was surged using a solid PVC surge block for approximately 10 minutes, or until no more settling of the filter sand occurred inside the borehole. A bentonite seal, consisting of approximately 6 feet of bentonite pellets, was placed immediately on top of the sand pack and hydrated with potable water. If the bentonite seal was installed below the water table surface, the bentonite pellets were allowed to hydrate in the groundwater. The bentonite seal placement and hydration followed procedures in Appendix C of the SAP (IT, 2000a). The well was then grouted to ground surface. A locking well cap was placed on the PVC well casing. The well surface completion included placing a protective steel casing over the PVC riser and installing a concrete pad around the protective steel casing. Concrete-filled protective steel posts were placed around the well pad.

The wells were developed by surging and pumping with a submersible pump in accordance with methodology outlined in Section 4.8 and Appendix C of the SAP (IT, 2000a). The submersible pump used for well development was moved in an up-and-down fashion to encourage any residual well installation materials to enter the well. These materials were then pumped out of the well in order to re-establish the natural hydraulic flow conditions. Development continued until the water turbidity was equal to or less than 20 nephelometric turbidity units (NTU), for a maximum of 8 hours, or until the well had been pumped dry and allowed to recharge repeatedly. The well development logs are included in Appendix C.

3.1.4 Water Level Measurements

The depth to groundwater was measured in the permanent wells installed by IT at the Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7), on March 14, 2000, following procedures outlined in Section 4.18 of the SAP (IT, 2000a). Depth to groundwater was measured with an electronic water level meter. Measurements were referenced to the top of the well casing (Table 3-4).

3.1.5 Groundwater Sampling

IT collected groundwater samples from four monitoring wells at the Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7). The well locations are shown on Figures 3-1 and 3-2. The groundwater sampling locations and rationale are listed in Table 3-1. The groundwater sample designations and QA/QC samples are listed in Table 3-5.

Table 3-4

Groundwater Elevations
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7)
Fort McClellan, Calhoun County, Alabama

Well Location	Date	Depth to Water (ft BTOC)	Top of Casing Elevation (ft above msl)	Ground Elevation (ft above msl)	Groundwater Elevation (ft above msl)
GSBP-154-MW01	14-Mar-00	77.02	873.99	872.02	796.97
GSBP-154-MW02	14-Mar-00	72.93	875.26	873.14	802.33
GSBP-154-MW03	14-Mar-00	69.48	868.39	866.33	798.91
GSBP-154-MW04	14-Mar-00	71.66	859.00	856.79	787.34

Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

BTOC - Below top of casing
ft - Feet
msl - mean sea level

Table 3-5

Groundwater Sample Designations and QA/QC Samples
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	QA/QC Samples			Analytical Suite
		Field Duplicates	Field Splits	MS/MSD	
GSBP-154-MW01[a]	GSBP-154-MW01-GW-BQ3048-REG				TCL VOCs, TCL SVOCs, TAL Metals, Cl. Pesticides/Herbicides, PCBs, Nitroexplosives
GSBP-154-MW02[b]	GSBP-154-MW02-GW-BQ3049-REG				TCL VOCs, TCL SVOCs, TAL Metals, Cl. Pesticides/Herbicides, PCBs, Nitroexplosives
GSBP-154-MW03[b]	GSBP-154-MW03-GW-BQ3050-REG	GSBP-154-MW03-GW-BQ3051-FD			TCL VOCs, TCL SVOCs, TAL Metals, Cl. Pesticides/Herbicides, PCBs, Nitroexplosives
GSBP-154-MW04[a]	GSBP-154-MW04-GW-BQ3052-REG				TCL VOCs, TCL SVOCs, TAL Metals, Cl. Pesticides/Herbicides, PCBs, Nitroexplosives

[a] Groundwater samples were collected from the approximate midpoint of the saturated screened interval of the monitoring well.

[b] Groundwater samples were collected using a Teflon™ bailer because well was purged dry.

Cl - Chlorinated.
FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
PCB - Polychlorinated biphenyl.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SVOC - Semivolatile organic compound.
TAL - Target analyte list.
TCL - Target compound list.
VOC - Volatile organic compound.

Sample Collection. Groundwater sample collection was performed following procedures outlined in Section 4.9.1.4 of the SAP (IT, 2000a). Groundwater was sampled after purging a minimum of three well volumes and after field parameters (temperature, pH, dissolved oxygen, specific conductivity, oxidation-reduction potential, and turbidity) stabilized. Purging was performed with a submersible pump equipped with Teflon™ tubing. Monitoring wells GSBP-154-MW01 and GSBP-154-MW04 were sampled using the submersible pump. Wells GSBP-154-MW02 and GSBP-154-MW03 were sampled using Teflon bailers because the wells were purged dry the preceding day. Field parameters were measured using a calibrated water-quality meter. Field parameter readings are summarized in Table 3-6. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-5 using methods outlined in Section 3.3.

3.2 Surveying of Sample Locations

IT sample locations were surveyed using global positioning system survey techniques described in Section 4.3 of the SAP (IT, 2000a) and conventional civil survey techniques described in Section 4.19 of the SAP (IT, 2000a). Horizontal coordinates were referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983. Elevations were referenced to the North American Vertical Datum of 1988. Horizontal coordinates and elevations are included in Appendix D.

QST surveyed sample locations using global positioning system survey techniques or traditional surveying techniques described in the QST work plan (QST, 1998). Map coordinates for each sample location were determined using a Universal Transverse Mercator or State Planar grid to within ±3 feet (±1 meter). Horizontal coordinates are included in Appendix D.

3.3 Analytical Program

Samples collected during the SI were analyzed for various chemical parameters based on the potential site-specific chemicals and on EPA, ADEM, FTMC, and USACE requirements. Target analyses for the samples collected at the Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7), included:

- Target compound list volatile organic compounds (VOC) – EPA Method 8260B
- Target compound list semivolatile organic compounds (SVOC) – EPA Method 8270C
- Target analyte list metals – EPA Method 6010B/7000

Table 3-6

Groundwater Field Parameters
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Date	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Temperature (°C)	Turbidity (NTU)	pH (SU)
GSBP-154-MW01	09-Dec-99	0.048	5.00	40	16.8	296	5.82
GSBP-154-MW02	10-Dec-99	0.073	4.55	10	15.6	483	5.69
GSBP-154-MW03	08-Dec-99	0.098	1.36	90	15.0	495	6.32
GSBP-154-MW04	08-Dec-99	0.020	4.31	115	17.0	150	5.42

°C - Degrees Celsius.
mg/L - Milligrams per liter.
mS/cm - Millisiemens per centimeter.
mV - Millivolts.
NTU - Nephelometric turbidity units.
ORP - Oxidation-reduction potential.
SU - Standard units.